

CLAIMS

1. A multicast service providing system of
performing multicast information distribution service to a
5 radio terminal present within a service area via a radio
section from an information distributing apparatus,
wherein:

said radio terminal has service continuation
requesting means transmitting to said information
10 distributing apparatus a service continuation request
signal for requesting continuation of multicast
information distribution service;

said information distributing apparatus has
service continuation management means managing as to
15 whether or not the above-mentioned request for service
continuation from the radio terminal for the multicast
information distribution service has been made; and

said information distributing apparatus
transmits to said radio terminal information managed by
20 the service continuation management means has been made
indicating whether or not the continuation request for the
multicast information distribution service has been made.

2. The multicast service providing system as
25 claimed in claim 1, wherein:

said service management means has management
state resetting means resetting a management state thereof
into a state that no request for continuation of service
for the multicast information distribution service from
30 the radio terminal has been made.

3. The multicast service providing system as
claimed in claim 2, wherein:

said management state resetting means performs a resetting operation for the management state every predetermined period.

- 5 4. The multicast service providing system as claimed in claim 2 or 3, wherein:

 said radio terminal has continuation request control means performing a control such that, when the information indicating whether or not continuation request
10 for the multicast information distribution service has been made transmitted from the information distribution apparatus indicates a state that the request has not been made, the service continuation requesting means transmits the service continuation request signal to the information
15 distributing apparatus.

5. The multicast service providing system as claimed in claim 4, wherein:

 said continuation request control means controls
20 said service continuation requesting means so that the service continuation request signal is transmitted after a first random time has elapsed since the information indicating the state that no continuation request has been made for the multicast information distribution service
25 was received from said information distributing apparatus.

6. The multicast service providing system as claimed in claim 4 or 5, wherein:

 said radio terminal has re-transmission control
30 means performing a control such that said service continuation requesting means re-transmits the service continuation request signal to said information distributing apparatus when the information indicating as

to whether or not continuation request has been made for the multicast information distribution service has not been changed into information indicating that the request has been made within a predetermined time after the
5 service continuation requesting means transmitted the service continuation request signal.

7. The multicast service providing system as claimed in claim 6, wherein:

10 said re-transmission control means controls said service continuation requesting means so that the service continuation request signal is transmitted again after a second random time has elapsed after the predetermined time had elapsed since said service continuation
15 requesting means transmitted the service continuation request signal.

8. The multicast service providing system as claimed in claim 6 or 7, wherein:

20 a setting is made such that a time taken since the above-mentioned management state resetting means reset the management state of the service request management means into a state that no request for continuation of service for the multicast information distribution service
25 has been made until the above-mentioned service continuation request means re-transmits the service continuation request signal be shorter than a time taken since the above-mentioned management state was reset to the state that continuation for a service has not been
30 made from the radio terminal for the multicast information distribution service until the resetting is made subsequently.

9. The multicast service providing system as claimed in any one of claims 1 through 8, wherein:

said service continuation management means manages as to whether or not continuation request has been
5 made for the multicast information distribution service by using a flag which is made to be ON when the service continuation request signal is received from the radio terminal.

10 10. A multicast service providing method, wherein:

when an information distributing apparatus performs multicast information distribution service to a radio terminal present within a service area via a radio
15 section,

said information distributing apparatus manages as to whether or not request for service continuation from the radio terminal for the multicast information distribution service has been made, and, also,

20 transmits thus-managed information indicating whether or not the continuation request for the multicast information distribution service management has been made to the radio terminals, and

said radio terminal transmits a service
25 continuation request signal to said information distributing apparatus when the information transmitted from the information distributing apparatus indicating whether or not service continuation request has been made by said radio terminal for the multicast information
30 distribution service indicates a state that the request has not been made.

11. The multicast service providing method as

claimed in claim 10, wherein:

the management state as to whether or not
continuation request has been made for the multicast
information distribution service from the radio terminal
5 is reset to a state that no continuation request for the
multicast information distribution service has been made
from the radio terminal, periodically.

12. The multicast service providing method as
10 claimed in claim 10 or 11, wherein:

when the information indicating whether or not
continuation request has been made for the multicast
information distribution service is not changed into a
state that the request has been made within a
15 predetermined time after the radio terminal transmitted
the service continuation request signal, the service
continuation request signal is transmitted to the
information distributing apparatus again.

20 13. An information distributing apparatus which
performs multicast information distribution service via a
radio section to a radio terminal present within a service
area, comprising:

service continuation management means managing
25 as to whether or not service continuation request has been
made by the radio terminal for the multicast information
distribution service,

information managed by said service continuation
management means indicating as to whether or not
30 continuation request for the multicast information
distribution service being transmitted to the radio
terminal.

14. The information distributing apparatus as claimed in claim 13, wherein:

the service continuation management means has management state resetting means resetting the management
5 state into a state that no service continuation request has been made by the radio terminal for the multicast information distribution service.

15. The information distributing apparatus as
10 claimed in claim 14, wherein:

said management state resetting means performs the resetting operation every predetermined period.

16. A radio terminal which receives multicast
15 information distribution service from an information distributing apparatus via a radio section, comprising:

service continuation request means transmitting a service continuation request signal for requesting provision of the multicast information distribution
20 service, to the information distributing apparatus; and continuation request control means controlling said service continuation request means so as to cause it to transmit the service continuation request signal to the information distributing apparatus when information
25 indicating whether or not service continuation request has been made by the radio terminal for the multicast information distribution service, transmitted by the information distributing apparatus which manages as to whether or not the service continuation request has been
30 made by the radio terminal for the multicast information distribution service, indicates a state that the request has not been made.

17. The radio terminal as claimed in claim 16,
comprising re-transmission control means controlling the
service continuation request means so that the service
continuation request means re-transmits the service
5 continuation request signal to the information
distributing apparatus, when the information indicating
whether or not service continuation request has been made
by the radio terminal for the multicast information
distribution service has not been changed into a state
10 that the request has been made within a predetermined time
after the service continuation request means transmitted
the service continuation request signal.

18. A multicast service providing method by
15 which multicast information distribution service is
performed by an information distributing apparatus via a
radio section on radio terminals present in a service area
thereof:

wherein:

20 the information distributing apparatus informs
all the radio terminals present in the service area of
information for identifying multicast information on
distribution and radio channels used for the distribution
of the multicast information by using a predetermined
25 radio channel, and

the respective radio terminals within the
service area receive the multicast information
distribution service from the information distributing
apparatus via the thus-informed radio channels.

30

19. The multicast service providing method as
claimed in claim 18, wherein:

the information distributing apparatus manages

correspondence relationship between the information for identifying the multicast information on distribution service and the radio channels used for distributing the multicast information, and

5 informs all the radio terminals present within the service area management information indicating the correspondence relationship by using the above-mentioned predetermined radio channel, and

10 each of the radio terminals present within the service area receives the desired multicast information distribution service by using the corresponding radio channels based on the management information.

20. The multicast service providing method as
15 claimed in claim 19, wherein:

the radio terminal transmits a service request signal for requesting distribution service of multicast information not included in the management information, to the information distributing apparatus;

20 when receiving said service request signal from the radio terminal, the information distributing apparatus adds to the management information a correspondence relationship between information identifying the multicast information concerning said request and a radio channel
25 used for distributing the multicast information; and, also

starts distribution service of the multicast information concerning said request by using said radio channel.

30 21. The multicast service providing method as claimed in any one of claims 18 through 20, wherein:

the information distributing apparatus informs a continuation check signal for inquiring a necessity of

continuation of the multicast information distribution service, to all the radio terminals present in the service area;

5 when receiving the continuation check signal from the information distributing apparatus, the radio terminal transmits a predetermined response signal to the information distributing apparatus for continuously receiving the multicast information distribution service; and

10 when receiving the predetermined response signal after transmitting the continuation check signal, the information distributing apparatus continues distributing service of the multicast information concerning the inquiry.

15 22. The multicast service providing method as claimed in claim 21, wherein:

 in case the response signal has not been received from any of the radio terminals in response to
20 the continuation check signal within a predetermined time, the information distributing apparatus terminates distribution service of the multicast information concerning the inquiry.

25 23. The multicast service providing method as claimed in claim 21 or 22,

 said information distributing apparatus manages
correspondence relationship between information
identifying the multicast information on distribution
30 service and radio channels used for distributing the multicast information, and transmits management information indicating the correspondence relationship to all the radio terminals present within the service area;

and

a correspondence relationship between multicast
information for which distribution service is terminated
and a radio channel used for distributing the multicast
5 information is deleted from the management information.

24. The multicast service providing method as
claimed in claim 21 or 22, wherein:

said information distributing apparatus manages
10 correspondence relationship between information for
identifying multicast information on distribution service
and radio channels used for distributing the multicast
information, and informs management information indicating
the correspondence relationship to all the radio terminals
15 present within the service area by using the predetermined
channel; and

deletes a correspondence relationship between
information for identifying multicast information for
which distribution service is terminated and a radio
20 channel used for distributing the multicast information
from the management information.

25. The multicast service providing method as
claimed in any one of claims 21 through 24, wherein:

25 the radio terminal transmits a reception
termination signal to the information distributing
apparatus for terminating distribution service of
multicast information; and

when receiving the reception termination signal
30 from the radio terminal, the information distributing
apparatus informs a continuation check signal for
inquiring a necessity of continuation of the multicast
information distribution service concerning the

distribution service reception termination to all the radio terminals present within the service area.

26. A multicast service providing system in
5 which multicast information distribution service is made by an information distributing apparatus to radio terminals present within a service area via a radio section, wherein:

the information distributing apparatus has
10 information control means informing, by using a predetermined radio channel, all the radio terminals present within the service area, of information for identifying multicast information on distribution service and radio channels used for distributing the multicast
15 information; and

each radio terminal present within the service area receives the multicast information distribution service from the information distributing apparatus by using the radio channels thus informed of.

20

27. The multicast service providing system as claimed in claim 26, wherein:

the information distributing apparatus has management means managing correspondence relationship
25 between the information identifying the multicast information on distribution service and the radio channels used for distributing the multicast information, and

informs, of management information indicating the correspondence relationship, all the radio terminals
30 present within the service area by using a predetermined radio channel; and

each radio terminal present within the service area receives the desired multicast information

distribution service from the information distributing apparatus via the corresponding radio channels based on the management information.

5 28. The multicast service providing system as claimed in claim 27, wherein:

the radio terminal has service requesting means transmitting a service request signal for requesting distribution service for multicast information not
10 included in the management information;

the information distributing apparatus has first management information updating means adding, when receiving said service request signal from the radio terminal, to the management information, a correspondence
15 relationship between information for identifying the multicast information concerning the request and a radio channel used for distributing the multicast information, and

as well as updates the management information by
20 the first management information updating means, starts distribution service of the multicast information concerning the request by using said radio channel.

30. The multicast service providing system as
25 claimed in any one of claims 27 through 29, wherein:

the information distributing apparatus has service continuation check means informing all the radio terminals present within the service area of a continuation check signal for inquiring a necessity of
30 continuation of the multicast information distribution service;

the radio terminal has response signal transmission control means transmitting, when receiving

the continuation check signal from the information distributing apparatus, a predetermined response signal for continuously receiving the multicast information distribution service; and, further

5 the information distributing apparatus has service continuation control means continuing, when receiving the predetermined response signal from the service continuation check means after transmitting the service continuation check signal, the multicast
10 information distribution service concerning the inquiry.

31. The multicast service providing system as claimed in claim 30, wherein:

 the information distributing apparatus has
15 service termination control means terminating, when the response signal has not been received from any of the radio terminals within a predetermined time in response to the continuation check signal, the multicast information distribution service concerning the inquiry.

20

32. The multicast service providing system as claimed in claim 30 or 31, wherein:

 said service continuation check means informs all the radio terminals present within the service area of
25 the continuation check signal as well as information for identifying the multicast information on distribution service and radio channels used for distributing the multicast information by using the predetermined radio channel.

30

33. The multicast service providing system as claimed in any one of claims 30 through 32, wherein:

 said information distributing apparatus manages

correspondence relationship between information
identifying multicast information on distribution service
and radio channels used for distributing the multicast
information, and informs all the radio terminals present
5 within the service area management information indicating
the correspondence relationship by using the predetermined
radio channel; and

said information distributing apparatus has
second management information updating means deleting a
10 correspondence relationship between information
identifying multicast information for which distribution
service is terminated and a radio channel used for
distributing the multicast information, from the
management information.

15

34. The multicast service providing system as
claimed in any one of claims 30 through 32, wherein:

the radio terminal has termination control means
transmitting, when terminating reception of a multicast
20 information distribution service, a reception termination
signal to the information distributing apparatus; and

when receiving the reception termination signal
from the radio terminal, the service continuation check
means of the information distributing apparatus transmits
25 a continuation check signal for inquiring a necessity of
continuation of the multicast information distribution
service concerning the distribution service reception
termination to all the radio terminals present within the
service area.

30

35. An information distributing apparatus
performing multicast information distribution service for
radio terminals present within a service area via a radio

section, comprising:

informing control means for informing all the
radio terminals present within the service area of
information for identifying multicast information on
5 distribution service and radio channels used for
distributing the multicast information by using a
predetermined radio channel,

each of the radio terminals present within the
service area being able to receive the multicast
10 information distribution service via the thus-informed
radio channels.

36. The information distributing apparatus
claimed in claim 35, comprising:

15 management means managing correspondence
relationship between multicast information on distribution
service and radio channels used for distributing the
multicast information,

said informing control means informing all the
20 radio terminals present within the service area of
management information indicating the correspondence
relationship managed by said management means, by using
the predetermined radio channel.

25 37. The information distributing apparatus as
claimed in claim 36, wherein:

said management means comprises first management
information updating means adding, when receiving a
service request signal concerning multicast information
30 for which distribution service has not been made from the
radio terminal, a correspondence relationship between
information identifying the multicast information
concerning the request managed by said management means

and a radio channel used for distributing the multicast information, to the management information,

as well as the management information being updated by said first management information updating means, distribution service of the multicast information concerning the request being started by using said radio channel.

38. The information distributing apparatus as claimed in any one of claims 35 through 37, comprising:

service continuation check means informing all the radio terminals present within the service area of a continuation check signal for inquiring a necessity of continuation of the multicast information distribution service; and

service continuation control means continuing, when receiving a predetermined response signal after transmitting the service continuation check signal by said service continuation check means, the multicast information distribution service concerning the inquiry.

39. The information distributing apparatus as claimed in claim 38, comprising:

service termination control means terminating, when a response signal has not been received from any one of the radio terminals within a predetermined time in response to the continuation check signal by said service continuation check means, the multicast information distribution service concerning the inquiry.

40. The information distributing apparatus as claimed in claim 38 or 39, wherein:

said service continuation check means informs

all the radio terminals present within the service area of the continuation check signal as well as information for identifying the multicast information on distribution service and radio channels used for distributing the
5 multicast information by using the predetermined radio channel.

41. The information distributing apparatus as claimed in any one of claims 38 through 40, comprising:
10 said management means managing correspondence relationship between information identifying multicast information on distribution service and radio channels used for distributing the multicast information, and informing all the radio terminals present within the
15 service area management information managed by said management means indicating the correspondence relationship by using the predetermined radio channel; and
second management information updating means deleting a correspondence relationship between information
20 identifying multicast information for which distribution service is terminated and a radio channel used for distributing the multicast information, from the management information.

25 42. The distributing apparatus as claimed in any one of claims 38 through 41, wherein:
when receiving, from the radio terminal receiving multicast information distribution service, a reception termination signal indicating termination of the
30 reception of distribution service, said service continuation check means transmits a continuation check signal for inquiring a necessity of continuation of the multicast information distribution service concerning the

distribution service reception termination to all the radio terminals present within the service area.

43. A radio terminal which receives multicast
5 information distribution service via a radio section from
an information distributing apparatus, comprising:
service state reception control means receiving
from the information distributing apparatus management
information indicating correspondence relationship between
10 information for identifying multicast information on
distribution service and radio channels used for
distributing the multicast information,
such as to receive from the information
distributing apparatus the desired multicast information
15 distribution service via the corresponding radio channels
based on the management information received by the
service state reception control means.

44. The radio terminal as claimed in claim 43,
20 comprising:
service requesting means transmitting a service
request signal for requesting a distribution service for
multicast information not included in the management
information to the information distributing apparatus,
25 such that the information distributing apparatus
may add, when receiving said service request signal from
the radio terminal, to the management information, a
correspondence relationship between information for
identifying the multicast information concerning the
30 request and a radio channel used for distributing the
multicast information, and, also, distribution service of
the multicast information concerning the request may be
started by using said radio channel.

45. The radio terminal as claimed in claim 43 or 44, comprising:

response signal transmission control means transmitting, when receiving a continuation check signal
5 for inquiring a necessity of continuation of multicast information distribution service from the information distributing apparatus, a predetermined response signal for continuously receiving the multicast information distribution service.

10

46. The radio terminal as claimed in claim 45, comprising:

termination control means transmitting a reception termination signal to the information
15 distributing apparatus for terminating reception of multicast information distribution service,

such that said information distributing apparatus may inform, when receiving the reception termination signal from the radio terminal, all the radio
20 terminals present within the service area of a continuation check signal for inquiring a necessity of continuation of the multicast information distribution service concerning the distribution service reception termination.

25

47. A multicast service providing method by which multicast data is distributed to radio terminals from a radio base station, wherein:

the radio terminal which receives the multicast
30 data transmits a distribution request for multicast data to a radio base station on movement destination in case a necessity arises such that the other party of communication be switched from a radio base station on

movement origin to the radio base station on movement destination,

the radio base station on movement destination transmits information of a radio channel used for
5 distributing the multicast data to the radio terminal in response to the distribution request given therefrom, and

the radio terminal switches the radio channel based on the information of the radio channel given by the radio base station on movement destination and receives
10 the multicast data from the radio base station on movement destination.

48. The multicast service providing method as claimed in claim 47, wherein:

15 the radio terminal transmits the distribution request for the multicast data to the radio base station on movement origin, and the distribution request for the multicast data is transmitted to the radio base station on movement destination via the radio base station on
20 movement origin.

49. The multicast service providing method as claimed in claim 47 or 48, wherein:

in case the radio terminal cannot receive
25 information of the radio channel to be used for distributing the multicast data within a predetermined time after transmitting the distribution request, the radio terminal transmits the distributing request again.

30 50. The multicast service providing method as claimed in any one of claims 47 through 49, wherein:

the radio terminal transmits the distribution request several times.

51. The multicast service providing method as claimed in any one of claims 47 through 50, wherein:

the radio base station on movement origin obtains information concerning multicast data distributed
5 by an adjacent radio base station, and transmits the information concerning the multicast data, and

in case the radio terminal determines that the radio base station on movement destination does not distribute the desired multicast data based on the
10 information concerning the multicast data given by the radio base station on movement origin, the radio terminal transmits the distribution request to the radio base station on movement destination or the radio base station on movement origin so that the distribution request may be
15 received by the radio base station on movement destination.

51. A radio base station which transmits multicast data to a radio terminal, comprising:

distribution request receiving means receiving a
20 distribution request for multicast data transmitted from the radio terminal, and

radio channel information transmitting means transmitting information of a radio channel used for distributing the multicast data in response to the
25 distributing request for the multicast data given by the radio terminal.

52. The radio base station as claimed in claim 51, wherein:

30 the distribution request receiving means receives the distribution request for multicast data transmitted from the radio terminal via another radio base station.

53. The radio base station as claimed in claim 51 or 52, wherein:

the distribution request receiving means comprises information obtaining means obtaining
5 information concerning multicast data transmitted from a radio base station adjacent thereto, and

multicast information transmitting means transmitting the information concerning the multicast information.

10

54. A radio terminal which receives multicast data distributed by a radio base station, comprising:

distribution request transmitting means transmitting a distribution request for multicast data to
15 a radio base station on movement destination in case a necessity arises such that the other party of communication be switched from a radio base station on movement origin to the radio base station on movement destination, and

20 multicast data reception control means for switching a radio channel based on information concerning a radio channel used for distributing the multicast data transmitted from the radio base station on movement destination in response to the distribution request so as
25 to receive the multicast data distributed from the radio base station on movement destination.

55. The radio terminal as claimed in claim 54, wherein:

30 the distribution request transmitting means transmits the distribution request for the multicast data to the radio base station on movement origin so that the distribution request for the multicast data be transmitted

to the radio base station on movement destination via the radio base station on movement origin.

56. The radio terminal as claimed in claim 54
5 or 55, wherein:

the request transmitting means transmits the distribution request again in case information concerning the radio channel to be used for distributing the multicast data cannot be received within a predetermined
10 time after transmitting the distributing request.

57. The radio terminal as claimed in any one of claims 54 through 56, wherein:

the distribution request transmitting means
15 transmits the distribution request several times.

58 The radio terminal as claimed in any one of claims 54 through 57, wherein:

the distribution request transmitting means
20 transmits the distribution request to the radio base station on movement destination or the radio base station on destination origin so that the distribution request for the multicast data be received by the radio base station on movement destination in case the distribution request
25 transmitting means determines that the radio base station on movement destination does not distribute the desired multicast data based on information, received from the radio base station on movement origin, concerning multicast information distributed from the radio base
30 station adjacent to the station.